

What is Claimed:

1. A bioreactor comprising:
 - a vessel having a bottom region and an interior configured to contain an aqueous suspension of biomass and media;
 - a first gas outlet at the bottom region of the vessel, said first gas outlet positioned to introduce a first stream of gas to promote growth of said biomass on said media;
 - a lift tube disposed within the vessel, the lift tube having an inlet disposed at the bottom region of the vessel; and
 - a second gas outlet positioned to feed gas into the lift tube at a location proximal to the inlet of the lift tube, said second gas outlet configured to introduce a second stream of gas to promote separation of said biomass from said media in said lift tube.
2. The bioreactor of claim 1 wherein there is a plurality of lift tubes disposed within the vessel.
3. The bioreactor of claim 1 wherein the first gas outlet comprises a fine bubble aerator.
4. The bioreactor of claim 1 further comprising at least one gas source connected to deliver gas to the first gas outlet, to the second gas outlet, or to the first gas outlet and the second gas outlet.
5. The bioreactor of claim 1 wherein the gas is air.
6. The bioreactor of claim 1 wherein the gas is oxygen.
7. The bioreactor of claim 1 wherein the vessel is a waste water treatment vessel.
8. The bioreactor of claim 1 wherein the lift tube is oriented substantially vertically within the vessel.
9. In a bioreactor containing biomass and media, a method for promoting biomass growth and separating biomass from the media, said method comprising the steps of:

introducing a first stream of gas into the bioreactor to promote the growth of biomass on the media;

introducing a second stream of gas into the bioreactor near an inlet of a lift pipe to generate sufficient shear forces to separate biomass from the media.

10. The method of claim 9 wherein the step of introducing the first stream of gas is performed through an air sparger.

11. The method of claim 10 wherein the step of introducing the first stream of gas comprises passing the gas through a fine bubble aerator.

12. The method of claim 9 wherein the steps of introducing the first stream of gas and the second stream of gas comprise introducing the first stream of gas and the second stream of gas from a gas source.

13. The method of claim 9 wherein at least one of the introducing steps comprises introducing air.

14. The method of claim 9 wherein at least one of the introducing steps comprises introducing oxygen.

15. The method of claim 9 further comprising the step of treating waste water in the bioreactor.

16. The method of claim 9 further comprising the step of adding a contaminated waste water stream into the vessel before introducing the first and second streams of gas.

17. The method of claim 16 further comprising the step of removing a purified water stream from the bioreactor after sufficient gas has been introduced to the bioreactor that the contaminants have been reduced.

18. In a bioreactor comprising a vessel having an interior configured to contain an aqueous suspension of biomass and media and a lift tube having an inlet, a method comprising the steps of:

introducing a first stream of gas into the bioreactor to promote the growth of the biomass on the media; and

introducing a second stream of gas into the inlet of the lift tube to generate shear forces to separate the biomass from the media.

19. The method of claim 18 wherein the step of introducing the first stream of gas comprises passing the gas through a fine bubble aerator.

20. The method of claim 18 wherein the steps of introducing the first stream of gas and the second stream of gas comprise introducing the first stream of gas and the second stream of gas from a gas source.